XV. DESCRIPTION OF A FOSSIL HAWK FROM THE MIOCENE OF NEBRASKA.

By Alexander Wetmore.

(Plate XXXVIII.)

From material collected for the Carnegie Museum a number of years ago in the Agate Springs Quarries of Sioux County, Nebraska, I have recently received, through Mr. O. A. Peterson of that institution, a complete metatarsus of an extinct hawk, with a claw from the foot of some related form. In the observations on these specimens, which follow, the hawk is described as a new form.

1. **Geranoaëtus ales** sp. nov. (Pl. XXXVIII, figs. 1–5.)

Type: C. M. Cat. Vert. Foss., No. 1828, a complete right metatarsus.

Horizon: Miocene, Lower Harrison Beds, Quarry No. 2, Agate Springs Fossil Quarries, Sioux County, Nebraska. Collected by W. H. Utterback, summer of 1906.

Specific Characters: metatarsus similar to that of *Geranoaëtus melanoleucus* (Vieillot),[1] but smaller; base of talon extended farther down on shaft; head of talon swung toward center of bone; posterior semilunar groove relatively smaller and less open.

Description: Proximal face of head rudely rectangular in general outline; external glenoid facet slightly excavated, the depression elongated from front to back across head; internal glenoid facet more deeply cupped, rounded elliptical in form; intercondylar tubercle broad and flat, with a slightly irregular surface; internal glenoid facet at slightly lower level than outer one; anterior semilunar groove very slightly indicated; posterior semilunar groove deep, with external margin decidedly less than internal, due to projection of talon; internal margin rather evenly rounded; a round, excavated depression below head on anterior face, the upper margin sloping steeply to the proximal end of the bone, prolonged upward as an angle that extends up on projection of intercondylar tubercle; the two superior foramina are contained in this pit, which beyond them is constricted toward the inner side by the projecting tubercle for the tibialis anticus, and

[1] *Spizaëtus melanoleucus* Vieillot, Nouv. Dict. Hist. Nat., XXXII, 1819, p. 57. (Paraguay.)

continues into the anterior groove; crests for transverse ligament (for tendon of extensor digitorum communis) sharp-edged, slight, but distinctly evident, separated by a flattened space; tubercle for tibialis anticus strong, located externally to center of shaft, elongated in form, elevated at lower end, and merged gradually with shaft above; shaft rather slender, slightly expanded at upper end, tapered gradually to center, below which it is uniform for a distance, and then expanded to form a support for the trochlea; posterior face excavated by a broad channel that occupies entire surface, bounded by sharp, raised margins, broad and open above, deeper and narrower toward center, practically disappearing at level of attachment of first metatarsal; on anterior face below head a slightly indicated anterior sulcus, which disappears entirely at center of shaft; outer face nearly plane, with a very gradual curve toward middle; external ligamentous ridge very slightly indicated; both margins of external surface gently curving, expanded toward center, and then gradually reduced, with sharp angled junction throughout with anterior and posterior surfaces contracted to a very narrow plate immediately above inferior foramen; inferior foramen rather small, placed in an ovoid expansion at the lower end of a short, slightly impressed groove; surface of shaft internal to this groove nearly flat; inner margin of shaft a thin, compressed line, which from above swings in a graceful backward curve to below center, and then trends forward to terminate above articulation of first metatarsal, below which it is straight and more rounded; external head of talon very slightly elevated above level of internal glenoid facet, produced as an irregular knob-like process, which is truncate above, notched on its external face, and internally and below slopes gradually to merge into shaft; internal head of talon a produced compressed plate with an outer, somewhat expanded process which is partly broken away; above the talon it is sharply truncate, below it slopes rather abruptly in a knife-like margin to merge into the shaft, where it is continued as a faintly raised line for approximately 25 millimeters; external superior foramen opening behind internal to base of outer crest of talon; internal superior foramen indicated behind by a small pit external to lower margin of internal crest of talon; articular facet for first metatarsal cut at an oblique angle across sharp inner margin, with greater portion lying on posterior face, sharply cut above, with a slight, raised boundary, disappearing below; external trochlea a flattened plate which swings out at a slight angle, cut away on inner side for free half to a narrow plate one-half as wide as rest of bone; middle trochlea somewhat broader, at free end swung slightly outward, with a shallow articular groove extending completely around the free portion; outer and inner faces decidedly excavated; internal trochlea with a broad, central portion, excavated on inner face, with a triangular ala interna projecting outward from its posterior margin; a rather deep excavation on external surface.

Measurements: Total length 90.2 mm.; greatest breadth of head

15 mm.; greatest breadth across trochlea, 16.2 mm.; smallest transverse diameter of shaft, 7.6 mm.; distance from center of tubercle for tibialis anticus to upper end of shaft, 14.9 mm.

Remarks: The type, the only specimen seen, is well fossilized, and, like most specimens from the Miocene of the type-locality, is colored a pale greenish slate. It is in a remarkable state of preservation, as it is perfect, except for slight wear on the projecting points of the hypotarsus and the outer trochlea.

For some years past I have been uncertain as to the actual generic relationship of the fossil *Aquila dananus* Marsh[2] described from the broken distal end of a left tibio-tarsus collected by A. H. Ewing in July, 1870, from Loup Fork deposits in Nebraska. No illustration accompanied the original description, but a reproduction of a photograph of the type is given by Shufeldt.[3]

During a recent visit to the Peabody Museum, Yale University, I had opportunity, through the kindness of Dr. Richard S. Lull and Dr. M. R. Thorpe, to examine this type (Cat. No. 293) and to compare it with pertinent recent material, which I had brought with me for the purpose.

From this examination it appears that *Aquila dananus* represents a member of the genus *Geranoaëtus*, and should be known as *Geranoaëtus dananus* (Marsh). The species was slightly smaller than *Geranoaëtus melanoleucus*, the only modern form of the genus, but in general configuration is strikingly similar to that form, except that the opening above the supratendinal bridge appears broader, with a more gradual slope of the side of the shaft into the fossa beneath. The type evidently comes from a juvenile specimen, which had attained full size, but in which the bones had not completely ossified. It is probable that it comes from a bird which had just left the nest. It is well fossilized.

As Marsh's measurements, the only ones which have been published, are in lines, it may here be of value to give dimensions in millimeters taken from the type: Total transverse breadth across condyles, 16.9 mm.; greatest diameter of outer margin of internal condyle 11.1 mm.; distance from center of tubercle on outer face of internal condyle to lower margin, 5.4 mm.

[2]*Aquila dananus* Marsh, Amer. Journ. Sci., (3) II, August, 1871, p. 125.

[3]Trans. Conn. Acad. Arts Sci., XIX, February, 1915, pl. 2, fig. 13.

Geranoaëtus dananus appears wholly distinct from other species at present placed in the genus. *G. ales*, the only one with which it might be confused, is distinctly smaller, as indicated by the comparative difference in measurement between the lower end of the tibio-tarsus and the head of the metatarsus in similar hawks, a difference well without the range of individual variation due to sex. The difference in size between *dananus* and *ales* was easily evident when the articular surfaces of the two types were compared directly.

In past ages in number of species the long-legged eagles grouped in the genus *Geranoaëtus* apparently paralleled modern *Buteo*. The seven known at the present time are as follows:

Geranoaëtus dananus (Marsh) ..... Miocene;
" *ales* Wetmore ..... Miocene;
" *contortus* Wetmore ..... Upper Miocene;
" *conterminus* Wetmore ..... Lower Pliocene;
" *grinnelli* (Miller) ..... Pleistocene;
" *fragilis* (Miller) ..... Pleistocene;
" *melanoleucus* (Vieillot) ..... Pleistocene and Recent.

This type of hawk thus has persisted from Miocene times until the present period. The modern bird is restricted in present range to South America, but has been identified by L. H. Miller in Pleistocene cave-deposits in California.

2. Buteonidæ?

A large, somewhat worn claw, (C. M. Cat. Vert. Foss., No. 2207) secured by O. A. Peterson in Lower Harrison Miocene deposits, Quarry No. 1, Agate Springs Quarries, Sioux County, Nebraska, in July, 1908, represents an eagle, somewhat smaller than the Golden Eagle, of uncertain generic relationship.

EXPLANATION OF PLATE XXXVIII.

FIG. 1. *Geranoaëtus ales* Wetmore, sp. nov. Anterior face of right metatarsus. Type. 4/3 nat. size.

FIG. 2. Do. Posterior view of right metatarsus. Type. 4/3 nat. size.

FIG. 3. Do. Lateral view of right metatarsus. Type. 4/3 nat. size.

FIG. 4. Do. Outline of head of right metatarsus. Type. 4/3 nat. size.

FIG. 5. Do. Distal outline of trochleæ of right metatarsus. Type. 4/3 nat. size.

Geranoaëtus ales Wetmore, sp. nov.
(4/3 natural size.)